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Flange Management Approach for Reliable SMR Reactor Vessel Integrity

Small modular reactor (SMR) pressure vessels depend greatly on the integrity of a bolted flange assembly. Whether subject to periodic refuelling cycles or through-life secure closure, the reliability and security of Reactor Vessel and ancillary containment will determine the overall safety of an SMR. This paper proposes the application of a highly proven approach from heat exchanger integrity technology through calculation, to enhance the safety of SMR Reactor Pressure Vessels.
The "Flange Management"approach utilises holistic appreciation of flange design & calculation, seal specification and accurate bolt loading in the context of each specific application. Previous technology in nuclear has used varying methods, such as hot bolting, hydraulic tensioning and torque measurement. Whilst these have proven acceptable in some instances, the utilisation of Flange Management has emerged within nuclear structural inspection methodologies and offers a promising solution for the SMR community; reducing uncertainty, reducing time and reducing exposure to active environments within a plant. These integral elements of safety are achieved through practical elimination of uncertainty in design and an offer of simplification drawing on highly proven techniques.

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